

20066-13

55. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one pressure sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

56. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one flow rate sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

57. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one oxygen sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

B

20066-13

58. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments;

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output; and

at least one temperature sensor which senses cardiac activity, wherein the sensor is coupled to the signal generation circuitry, which generates the pulses responsive thereto.

59. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments; and

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output,

wherein the one or more electrodes comprise a net of addressable, non-excitatory stimulation electrodes that each have an area of at least 5 mm^2 and that applying the stimulation pulse to a heart segment having an area of at least 1 cm^2 .

60. (NEW) Apparatus for heart pacing with cardiac output modification, comprising:

one or more electrodes adapted to apply electrical signals to cardiac muscle segments; and

signal generation circuitry adapted to apply an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart and a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac output,

wherein the signal generation circuitry varies the extent of a portion of the area of the heart segment to which the non-excitatory stimulation pulse is applied.

B

20066-13

61. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) implanting a pacing electrode in a first chamber of a subject's heart;
- (b) implanting a non-excitatory stimulation electrode in another chamber of the subject's heart;
- (c) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
- (d) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

62. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) implanting at least one non-excitatory stimulation electrode in each of a plurality of chambers of a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

63. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) fixing at least one electrode to the epicardium of a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction.

B

20066-13

64. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) implanting at least one sensing electrode which senses cardiac activity in a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the electrodes to pace the heart; and
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the electrodes to modify the cardiac contraction,

wherein step (c) comprises detecting a QT interval in an electrical signal received by the sensing electrode and generating a pulse responsive thereto.

65. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying a flow sensor which senses cardiac activity to the subject's body.

wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

66. (NEW) a method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;

B

20066-13

- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying a pressure sensor which senses cardiac activity to the subject's body, wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

67. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying an oxygen sensor which senses cardiac activity to the subject's body, wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

68. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart;
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction; and
- (d) applying a temperature sensor which senses cardiac activity to the subject's body,

B

20066-13

wherein conveying the non-excitatory stimulation pulse comprises generating a pulse responsive to the activity.

69. (NEW) A method for heart pacing with modification of cardiac contraction, comprising the steps of:

- (a) applying one or more electrodes to a subject's heart;
- (b) conveying an excitatory electrical pulse to at least one of the one or more electrodes to pace the heart; and
- (c) conveying a non-excitatory stimulation pulse of a magnitude and at a timing at which it is unable to generate a propagating action potential to at least one of the one or more electrodes to modify the cardiac contraction,

wherein conveying the non-excitatory pulse comprises varying an area of the heart to which non-excitatory pulses are applied.

B